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The Actual State and Historical Development of Urban Forests and Urban Trees in Turkey

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Abstract

In this paper, the historical development of urban forests and trees in Turkey is summarised and also the actual state of trees in cities is explained. The floristic regions of the country are defined and according to those definitions some suggestions for successful urban tree and forest plantations are given. A table of trees used in cities in Turkey is provided.

Keywords: Urban forests, urban trees, history, current state, Turkey.

Introduction

There have been countless settlements of the land of Anatolia by several different civilisations in history. Historical settlement which date back to 2000-2500 years ago can still be seen in different parts of Turkey.

In the old days, trees were recognised for their symbolic and spiritual features, their fruits, their shade and shelter features in man's and societies' life (Holodonsky 1989). The importance and the value of trees have increased in parallel with the development of human life, and the tree's visual and functional effects have become more important.

Actually the understanding of the visual and functional effects of trees in urban landscapes has a very long history. It is known from historical texts that trees have been brought in from thousands of kilometres away to be planted in cities in Egypt. Information about the plantation and maintenance of trees was also given by Theophrastus (370-285 BC) and Plinius Secundus (Pliny the elder, 23-79AD) (Harris 1983).

However, the oldest record of trees and tree culture in Turkey dates back to 500 years ago. Information on still existing forests and on urban forests that were created in the past can be found in those records. Consequently, we can say that the beginning of the historical development of urban trees coincided with the era of the Ottoman Empire. In this text, the history of urban forests and trees in Turkey will be described in two main stages, namely the era of the Ottoman Empire and the era of the Turkish Republic.

The development of urban forests and trees in Turkey is of interest because Anatolia has very large different types of climate and also a rich variety of plant species. When the relationship between urban forest-trees and habitat traditions of societies is considered, Anatolia is a very interesting research object. In this paper, the main features of the management of urban forests and trees in Turkish society throughout history are described.

Urban forests and trees in the era of the Ottoman Empire

Era of Byzantium and the Early Ottoman Empire

According to information about this era, *Cupressus sempervirens* L. var. *Pyramidalis* and *Pinus pinea* were the most commonly planted exotic plant species. In addition to these, *Aesculus hippocastenum* L., *Salix babylonica* L., *Biota orientalis* Endl. were planted. The very first garden of the Bosphorus (Istanbul) was created in accordance with the wishes of the Sultan Mehmet II »The Conqueror« in 1458, and was named »Takod Bahcesi« (Tokad Garden). The cypresses, which had been planted in accordance with the wishes of Suleyman I »The Magnificent« in Fenerbahce (Istanbul), are still alive and have a wonderful 'monumental' appearance. But the very first urban forests of the Ottoman Empire (1299-1923) were created on the banks of the Golden Horn in Istanbul between 1450-1500.

Ancient Era of the Ottoman Empire

According to the wishes of the Sultan Ahmet III in 1722 and Sultan Mahmut I in the Bosphorus and Kagithane areas elm, oak, arbutus, ash, hornbeam, planetree, baytree, judastree and wild pear species were planted. Those trees planted were not from a nursery but from existing forests or waterside areas. According to our research the reason for this was that during the mid-18th century there was not a single nursery which produced

native and exotic plant species. In this period, the exotic plant species *Taxodium distichum* (L.) Rich., *Zelkova carpinifolia* (Pall.) K. Koch, *Fraxinus angustifolia* Valh. could be seen. Before the Tulip Period, several attempts were made to follow up on those plantations, but the major establishment of plantations began during the 17th and the beginning of 18th century. In the Tulip Period, groves for both recreational and aesthetic purposes were laid out at the rivers of Goksu and Kagithane and at several places on the Bosphorus, while plantations were also established at Baroque palaces and pavilions in Istanbul. In this period, known as the golden era of horticulture, several groves, especially in Bosphorus had been planted with native and exotic species, natural forest at the outskirts of cities had been turned into groves, and the plantations of palaces, pavilions and city centres had been established. Similar works were carried out in many Anatolian cities.

We can come across plantations made with plane tree, cypress, terebin tree, and mastic tree species especially in religious places (such as mosques, churches, theological schools, tombs and synagogues) dating from 500 years ago in several Turkish cities (Istanbul, Bursa, Edirne, Izmir etc. (Asan and Uzun 1994)). These trees are very precious as both natural and historical monuments, and not only make a major contribution to the green texture of cities, but also link the presence and the past of 500 years ago (Uzun 1996). Various researchers have described the monumental trees in several different Anatolian cities. Here, we will only mention results from 3 different projects concerned with Istanbul and its vicinity:

- 59 trees from 11 species (*Castanea sativa* (1), *Cedrus deodara* (4), *Cupressus sempervirens* (7), *Fagus orientalis* (1), *Fraxinus angustifolia* (5), *Pinus pinea* (2), *Pistacia atlantica* (2), *Platanus orientalis* (26), *Quercus robur* (7), *Sequoia sempervirens* (2), *Ulmus minor* (2)) were identified in the »Inventory of monumental trees in the Marmara region« (Yaltirik et al. 1994).
- In Fatih County, which almost covers Istanbul's entire historical peninsula, 66 trees from 5 species, (*Cupressus sempervirens* (15), *Pistacia atlantica* (11), *Platanus orientalis* (15), *Platanus acerifolia* (6) and *Celtis australis* (19)) were identified (Sengonul et al. 1996).
- In Kucuk Camlica and Buyuk Camlica Counties in Istanbul, 63 trees

from 11 species were defined as monumental trees: *Pinus pinea* (21), *Quercus robur* (10), *Cupressus sempervirens* (6), *Platanus orientalis* (1), *Quercus frainetto* (6), *Celtis australis* (2), *Tilia argentea* (2), *Cedrus deodara* (1) (Dirik et al. 1998).

Late Era of the Ottoman Empire, after Tanzimat (1839) and Islahat reforms (1856)

In this era, several palaces and countless pavilions and houses were built, and in their gardens trees and shrubs imported from European nurseries were planted. From research we now know that the first nurseries were established in the early 1900s at Ortakoy (Istanbul), by a German named C.H. Koch, and at Kadikoy (Istanbul) by a Frenchman named Adolphe Deroin-Yenne. In this period, the following species were mainly used: *Taxus baccata* L. 'Fastigiata', *Cephalotaxus harringtonia* K.Koch, *Ginkgo biloba* L., *Cedrus atlantica* (Endl.) Carr., *Cedrus deodora* (Roxb.) G.Don., *Cedrus libani* A. Rich, *Calocedrus decurens* (Torrey) Florin, *Sequoia sempervirens* (D.Don.) Endl., *Abies pinsapo* Boiss, *Quercus suber* L., *Quercus ilex* L., *Magnolia grandiflora* L., *Sophora japonica* L. 'Pendula', *Liriodendron tulipifera* L., *Pinus pinaster* Ait., *Pinus halepensis* Mill., *Platanus x acerifolia* (Ait) Willd., *Robinia pseudoacacia* L., *Ailanthus altissima* (Mill.) Swingle, *Pinus nigra* Arnold. subsp. *Nigra*.

At the end of the 18th century, urban trees and urban forests plantations were spreading in also in Anatolian cities. Within this period (in 1892), a large grove was established with aleppo pine, cypress, Austrian pine, thuja, cedar and ash species in Istanbul-Halkal. In order to set a good example, urban tree plantations were established in Sivas between 1882-1884, and a *Pinus pinea* grove which still exists was established in 1916 at Istanbul-Halic waterfront. Those plantations became spread to Istanbul's other areas, too. Several plantations were set up mainly with Eucalyptus and Palm tree species, and many subtropical were also used, as well as Mediterranean species in Dalaman (south-east Anatolia) and Antalya, Adana and Iskenderun (Mediterranean coast).

A study entitled »The Inventory of Exotic Tree and Bush Species of Istanbul's Parks, Gardens, Groves« was carried out between 1990-1994 by Yaltirik, Efe, Uzun (1994) as a book. The study identified 902 exotic trees and shrubs in Istanbul. This number shows that Istanbul has had a very

rich variety of plant species. All mature specimens were identified and their locations recorded. 285 out of 902 are single specimens or represent species very rarely found in Istanbul. The study gave the following descriptions of historical groves:

Groves on the European side of Istanbul:

1. Yildiz Grove: 46.7 hectare, open to public since 1950, has more than 120 mainly exotic tree species.
2. Naile Sultan Grove: 4.9 hectare, private grove.
3. Naciye Sultan Grove: 4.9 hectare, private grove.
4. Vakif (Foundations) Grove: 2.2 hectare; belongs to Istanbul's Foundations.
5. Emin Erkayinlar Grove: 10 hectare, private grove.
6. Ayse Sultan Grove: 6.5 hectare, private grove.
7. Arifi Pasha Grove: 2.2 hectare, private grove.
8. Bosphorus University Grove: 23 hectare, state university grove.
9. Emirgan Grove: 47.2 hectare, has more than 120 tree species and is managed by the Greater Municipality of Istanbul.
10. Said Halim Pasha Grove: 9.2 hectare, private grove, owned by Yapi-Kredi Bank.
11. Austrian Embassy Grove: 5.5 hectare, owned by the embassy; it was given to Franz Joseph II by Abdulhamit II.
12. French Embassy Grove: 7.5 hectare, owned by embassy, it was given to Ambassador General Sebastian by Selim III.
13. British Embassy Grove: 2.7 hectare, owned by the embassy.
14. German Embassy Grove: 17 hectare, owned by the embassy.
15. Huber Grove: 6,4 hectare, it is the summer pavilion garden of the Turkish president.
16. Spanish Embassy Grove: 1 hectare.
17. Russian Embassy Grove: 16.6 hectare.
18. French Orphanage Grove: 3.3 hectare, Saint Benoit French High school owns this grove.
19. Ayazaga Grove: 7.8 hectare, belongs to the Istanbul Culture and Art Foundation.

Groves on the Asian side of Istanbul:

1. Abraham Pasha Grove: 27.9 hectare, owned by Istanbul Greater Municipality.
2. Beykoz Pavilion Grove: 8 hectare, owned by Istanbul Greater Municipality.
3. Hide Ismail Pasha Grove: 17.2 hectare; known as Cubuklu Grove, owned by Istanbul Greater Municipality.
4. Mihrabad Grove: 25 hectare, owned by the Forest Ministry.
5. Amcazade Huseyin Pasha Grove: 6.3 hectare.
6. Cemil Filaber Grove: 13 hectare.
7. Kandilli Kiz Lisesi (High school) Grove: 2 hectare, owned by the state.
8. Vanikoy Observatory Grove: 9.2 hectare.
9. Vanikoy Grove (old seminary).
10. Vahdettin Grove: 5 hectare.
11. Uryanizade Cemil Molla Grove: 9 hectare.
12. Munir Bey Grove: 2.5 hectare, owned by state railways.
13. Fethi Pasha Grove: 16 hectare.
14. Demirag Grove: 10 hectare.
15. Huesyin Avni Pasha Grove: 4.45 hectare.
16. Abdulmecit Efendi Grove: 6.5 hectare.
17. Sehzade Yusuf Izzettin Efendi Grove: 2.2 hectare.
18. Kucuk Camlica Grove.
19. Adile Sultan Valide Bagi Grove: 10 hectare.

Urban forest and trees in the era of the Turkish Republic

The main and systematic plantations in cities and the outskirts of cities in Anatolia were started at the foundation of the Turkish Republic.

The most important plantations in the era of the Turkish Republic were established in the capital city of Ankara which lies in the steppe region of inland Anatolia in the 1930s. Gazi Grove was established in the north-west of Ankara on the order of Ataturk. In the same period, the Ataturk Forest in Florya Istanbul and Termal Grove in Yalova Termal were established. But the main plantation were undertaken after the Second World War.

According to Act of Plantations of that period, every village and municipality which lacked plantations should establish at least 5 hectares of forests. For that reason, several nurseries and 4924 hectares of village and municipality groves were established between the years of 1946-1955, using 4,900,000 saplings. Although this work was carried out in the villages and boroughs of the steppe region of inland Anatolia, success was usually limited. Besides in small towns and villages, plantations were also established in big cities like Ankara (Etimesgut-Harbiye), Eskisehir (Tulluce, Kocakr), Tokat (Camlbel) and Gaziantep (Dullubaba), resulting in urban forests totalling 3506 hectares. This was realised between 1946 and 1957, using 13,300,000 saplings. This example was then applied in all Anatolian cities.

Turkey's first Arboretum (Ataturk Arboretumu) was established in 1949 as a result of cooperation between the University of Istanbul's Faculty of Forestry and the Forest Ministry in order to introduce the richness of plant species to society and to be able to undertake research on plants for use in urban areas.

1960 is the beginning of the drawing up of plans in Turkey. Starting from then, large scale planning was undertaken. These works, carried out by the Plantation and Erosion Control Division of the Forest Ministry and municipalities, can be summarised as the establishment of urban forests, green belt projects, road plantations, erosion control by plantations, and establishing memorial forests. They extended over 50,000 hectares of land. Plantations in urban areas were undertaken by municipalities. As a consequence, the area of plantations per capita reached 2-15 m². Plantations including urban groves, road plantations in urban areas, open spaces, urban parks etc., implemented by municipalities, were spread all over the country by 1980.

According to the Reconstruction Regulations of Istanbul (1985), it is a must for detached housing to have at least 30% of the area beside the house planted. Atay et al. (1987) prepared a guide for species that can be used in urban plantations to meet those regulations. An inventory study for tree species used in urban areas all over Turkey was carried out by Urgenc and Dirik, in 1990. This inventory study, based on observations, research, a survey and literature, showed which tree species had been planted

successfully. This inventory study is combined with the study undertaken by Yaltirik, Efe and Uzun in 1997 in order to draw up the full list, which is shown in the Appendix (App. 1). A database for plantations in urban areas was formed.

But urban tree plantations have rocketed since 1990 and the variety of tree species used has been enlarged. Between 1995-1996, for example, 100,000 trees, and between 1996-1997 200,000 trees were planted in Istanbul. Similar works have been undertaken in other cities as well. The demand for planting stock was met by importing saplings from all over Europe, especially from Italy. Urban tree plantations were established not only by the state but also by community organisations. For these reasons, nurseries all over the country are getting better and bigger, and new nurseries are set up.

Evaluation

Phyto-geographic regions

As mentioned at the beginning of the paper, Turkey covers many eco-regions which have very different climate types. These variations both give opportunities and difficulties for urban and non-urban plantations. In order to suggest strategies for plantation and to explain existing situations, we need to consider Turkey's phyto-geographic regions. Thus activities can be generated for cities in different regions. Turkey can be divided into 3 main phyto-geographic regions:

1. Euro-Siberian (Euxin- Colchis),
2. Mediterranean ,
3. Irano -Turanian (see Figure 1).

Turkey is known as one of the richest floristic centres in the world. On the other hand, this rich floristic structure is very complex and heterogeneous. This complexity is mainly because of the geographical position of Turkey, and because the wide range of topography and climate. Turkey lies in the middle of conjunctions of different floristic regions, which contributes to that complexity.

Turkey's floristic regions are characterised as follows:



Fig. 1. Map of Turkey.

1. Euro-Siberian (Euxin-Colchis) Floristic Region: this region covers all of the northern part of Turkey (Black Sea coast and inner Black Sea region), and also almost all of the Caucasian region. Generally, in this region natural forests are very rich and ecological conditions allow for new urban forests. Cities in this region have enough forests and trees, from a quantitative aspect. But forest qualities should be improved. There are mainly deciduous tree species in the Euro-Siberian flora region, but at higher altitude there are more evergreen tree species.
2. Mediterranean Floristic Region: The Mediterranean Floristic Region starts at the Gallipolis Peninsula to the south of Trakya, and extends to the west and south of Anatolia's coastal region. At the end, it includes the mountain Amanos in the south-east. It includes sclerophyll woodland tree species and macchia (chaparral) species, which are the main floristic characteristics of the Mediterranean climate and region. Those vegetation formations are not very abundant because of the summer drought in the region, and also as there have been several different civilisations in history that have caused degradation of the native vegetation in the area. For that reason cities in the Mediterranean region need tree plantations at their outskirts. It should be mentioned that this region is very suitable not only for Mediterranean tree species, but also for sub-tropic and Far Eastern tree species.

3. **Irano-Turanian Floristic Region:** The Irano-Turanian region covers the Eastern, Inland and Western Anatolia regions. This region is the poorest forest region in Turkey. For that reason, cities in this region do not have native forest lands. Cities in this region with mainly steppe conditions often have plantations on their outskirts. These constitute the main plantation efforts of the Turkish Republic, if Istanbul is not included. Because the semi-drought continental and sometimes steppe climate as the main climate types, the establishment of new forest faces ecological difficulties. Because of those difficulties, success is very limited. Today it is attempted to improve the success rate of those plantations through the selection of suitable tree species and good maintenance. The Irano-Turanian Floristic Region in Turkey is surrounded by the European-Siberian Floristic Region in the North, the Mediterranean Floristic Region in the East and South. This region has steppe, mountain steppe and semi desert characteristics, which distinguish it from Iran and the Middle-East.

Recommendations and future perspectives

One of most important issues related to tree plantations in cities is the variety of species. The tree species variety in both urban and non-urban areas is very limited in Turkey. Most of the cities have only a few tree species, such as plane tree, cypress, limetree, stone pine, ash, maple, acacia (Uzun et al. 1996). This produces a very high risk of disease. Both qualitative and quantitative characteristics of urban trees should be improved, considering both the regional and inner-city ecological conditions. As mentioned above, ecological variations make it possible to work with different tree species. Especially tree species that originated in the Far East (South-east Asia, China etc.) are very suitable. But species selection should also consider the historical characteristics of the city.

Urban plantations with the goal of having one tree for every person in the city should be accelerated in cities especially in the Irano-Turanian floristic region. The role of community organisations should be considered officially and carefully.

As mentioned at the beginning of this text, there are several monumental trees across Turkey. Projects on monumental trees should be implemented all over the country. But it should be mentioned that besides carrying out

inventories of monumental trees, better maintenance techniques should be applied. Application of these techniques has been very limited in Turkey.

One of most important things to be done in Turkey with regards to urban trees and urban forests is the planning and management of trees. A methodological study on this matter has been done by Dirik (1996), but it has not been applied in practice. The status of trees in the urban environment should be defined by total area and by the distribution of species, age of trees and forests, health conditions, using global inventory, typology inventory and one-tree inventory techniques. Plantation and maintenance plans considering time and location conditions should be prepared based on data gathered from inventory studies.

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* NB All publications in Turkish unless stated differently.

Appendix 1

Tree species used for urban green area plantations in Turkey

- I Marmara Region: Sakarya, Kocaeli, Bursa, Istanbul, Tekirdag, Canakkale
 II Aegean Region: Mugla, Denizli, Aydin, Manisa
 III Mediterreian Region: Hatay, Adana, Icel, Antalya and partly Mugla
 IV Inland analolia Region: i.e. Eskiehir, Bilecik, Afyon, Usak, Isparta, Konya, Mugla, Kayseri, Sivas, Tokat, Amasya, Corum, Yozgat
 V West Black Sea Region: Sinop, Kastamonu, Zonguldak, Bolu, Sakarya, and partly Kocaeli, Istanbul
 VI East Back Sea Region: Artvin, Rize, Trabzon, Giresun, Ordu, Samsun
 VII Eastern Anatolia Region: i.e. Kars, Erzurum, Erzincan, Tunceli
 VIII Southeast Analolia Region: At the south Kahramanmaras, Adiyaman, Gaziantep, Diyarbakir, Urfa, Mardin, Siirt, in the north part Malatya, Elazig, Bingol, Mus, Bitlis, Van, Hakkari.

a. Coniferous trees	I	II	III	IV	V	VI	VII	VIII
<i>Abies alba</i>	X				X			
- <i>bornmülleriana</i>	X	X		X	X	X		
- <i>cephalonica</i>	X	X	X					
- <i>cilicica</i>	X	X	X	X				X
- <i>concolor</i>	X			X	X	X		
- <i>equi-trojani</i>	X	X						
- <i>grandis</i>	X				X	X		
- <i>lasiocarpa</i>	X				X	X	X	
- <i>nordmanniana</i>	X				X	X	X	
- <i>pinsapo</i>	X	X	X		X			
<i>Araucaria araucana</i>	X		X		X	X		
<i>Arceuthos drupacea</i>	X	X	X					X
<i>Biota orientalis</i>	X	X	X			X		X
<i>Calocedrus decurrens</i>	X							
<i>Cedrus atlantica</i>	X	X	X		X			
- <i>brevifolia</i>	X							
- <i>deodara</i>	X	X	X		X			
- <i>libani</i>	X	X	X	X	X			X
<i>Cephalotaxus drupacea</i>	X				X	X		
- <i>fortuni</i>	X							
- <i>harringtonia</i>	X							
<i>Chamaecyparis lawsoniana</i>	X				X	X		
- <i>nootkatensis</i>	X				X	X		
- <i>obtusa</i>	X				X	X		
- <i>pisifera</i>	X				X	X		
<i>Cryptomeria japonica</i>	X				X	X		
<i>Cunninghamia konishii</i>	X							
- <i>lanceolata</i>	X							
<i>xCupressocyparis leylandii</i>	X							
<i>Cupressus arizonica</i>	X	X	X	X	X	X		X
- <i>goveniana</i>	X	X	X		X	X		
- <i>macrocarpa</i>	X	X	X		X	X		

	I	II	III	IV	V	VI	VII	VIII
- <i>sempervirens</i>	X	X	X		X	X		X
<i>Cupressocyparis leylandii</i>	X				X	X		
<i>Cycas revoluta</i>	X	X	X					
<i>Ginkgo biloba</i>	X	X			X	X		
<i>Juniperus chinensis</i>	X	X			X	X		
- <i>communis</i>	X							
- <i>excelsa</i>	X	X	X	X	X	X		
- <i>foetidissima</i>	X	X	X	X			X	X
- <i>sabina</i>	X							
- <i>oxycedrus</i>	X							
- <i>virginiana</i>	X				X	X		
<i>Larix decidua</i>	X						X	
- <i>kaempferi</i>	X							
<i>Metasequoia glyptostroboides</i>	X				X			
<i>Picea abies</i>	X				X	X		
- <i>engelmanni</i>	X				X	X		
- <i>glauca</i>	X				X	X	X	
- <i>omorica</i>	X				X			
- <i>orientalis</i>	X				X	X	X	
- <i>pungens</i>	X			X	X	X		
- <i>sitchensis</i>	X				X	X		
- <i>smithiana</i>	X							
<i>Pinus brutia</i>	X	X	X		X			X
- <i>coulteri</i>	X							
- <i>elastica</i>				X				X
- <i>griffithii</i>	X	X						
- <i>halepensis</i>	X	X	X					X
- <i>nigra</i>	X	X	X	X	X			X
- <i>pinaster</i>	X	X			X	X		
- <i>pinea</i>	X	X	X		X	X		X
- <i>radiata</i>	X							
- <i>strobus</i>	X				X	X		
- <i>sylvestris</i>	X			X	X	X	X	X
<i>Pseudolarix amabilis</i>	X				X	X		
<i>Pseudotsuga menziesii</i>	X				X	X		
<i>Sequoia sempervirens</i>	X				X	X		
<i>Sequoiadendron giganteum</i>	X				X	X		
<i>Taxodium ascendens</i>	X							
- <i>distichum</i>	X							
<i>Taxus baccata</i>	X		X		X	X		
- <i>cuspidata</i>	X				X	X		
<i>Thuja occidentalis</i>	X	X	X	X	X	X	X	
- <i>plicata</i>	X				X	X		
<i>Thujopsis dolabrata</i>	X				X			
<i>Tsuga canadensis</i>	X				X	X		
b. Evergreen trees								
<i>Casuarina equisetifolia</i>		X	X					
<i>Ceratonia siliqua</i>	X		X					
<i>Chamaerops excelsa</i>	X							

	I	II	III	IV	V	VI	VII	VIII
- <i>humilis</i>	X	X	X					
<i>Magnolia grandiflora</i>	X	X			X	X		
<i>Phoenix canariensis</i>	X	X	X					
- <i>dactylifera</i>		X	X					
- <i>theophrastii</i>		X	X					
<i>Pistacia atlantica</i>	X		X					X
- <i>eurycarpa</i>	X							
- <i>terebinthus</i>	X							
<i>Quercus ilex</i>	X	X						
<i>Schinus molle</i>	X	X	X					
<i>Trachycarpus fortunei</i>	X	X						
<i>Washingtonia filifera</i>	X	X	X					
c. Deciduous trees								
<i>Acer campestre</i>	X	X		X	X	X		
- <i>cappadocicum</i>	X					X		
- <i>monspessulanum</i>	X		X		X		X	X
- <i>negundo</i>	X				X	X		X
- <i>palmatum</i>	X				X	X		
- <i>platanoides</i>	X	X	X	X	X		X	
- <i>pseudoplatanus</i>	X				X			
- <i>rubrum</i>	X							
- <i>saccharinum</i>	X					X	X	
- <i>saccharum</i>	X				X	X	X	
- <i>tataricum</i>	X			X		X		X
- <i>trautvetteri</i>	X				X	X		
<i>Aesculus x carnea</i>	X	X		X	X	X		
- <i>hippocastanum</i>	X	X		X	X	X		
- <i>pavia</i>	X							
<i>Ailanthus altissima</i>	X	X	X	X		X		X
<i>Albizia julibrissin</i>	X	X	X		X	X		
<i>Alnus glutinosa</i>	X	X				X		
- <i>orientalis</i>	X		X					
<i>Amorpha fruticosa</i>	X							
<i>Betula alba</i>	X							
- <i>litwinowii</i>	X							
- <i>lutea</i>	X							
- <i>medwediewii</i>	X							
- <i>nigra</i>	X							
- <i>pendula</i>	X					X	X	
<i>Broussonetia papyrifera</i>	X	X	X		X			
<i>Caesalpinia gilliesii</i>	X	X						
<i>Carya illinoensis</i>	X							
<i>Carpinus betulus</i>	X			X	X	X		
- <i>orientalis</i>	X		X		X	X		
<i>Castanea sativa</i>	X	X	X		X	X		
<i>Catalpa bignonioides</i>	X	X	X					X
<i>Celtis australis</i>	X	X	X		X	X		X
- <i>caucasica</i>				X	X	X		X

	I	II	III	IV	V	VI	VII	VIII
- <i>glabrata</i>			X	X	X	X	X	X
- <i>occidentalis</i>	X							
- <i>orientalis</i>				X				X
- <i>tournefortii</i>		X	X	X			X	
<i>Cercis siliquastrum</i>	X	X	X		X			X
<i>Corylus colurna</i>	X					X		
<i>Eucalyptus camaldulensis</i>	X	X	X					
<i>Fagus orientalis</i>	X		X	X	X	X		
- <i>silvatica</i>	X					X		
<i>Ficus carica</i>	X	X	X		X	X		X
<i>Fraxinus americana</i>	X							X
- <i>angustifolia</i>	X	X	X		X	X		X
- <i>exelsior</i>	X				X	X	X	
- <i>ornus</i>	X	X	X	X				
<i>Gleditschia triacanthos</i>	X	X			X			
<i>Jacaranda acutifolia</i>		X	X					
<i>Juglans nigra</i>	X							
- <i>regia</i>	X	X		X	X	X	X	X
<i>Koelreuteria paniculata</i>	X	X		X				X
<i>Lagerstroemia indica</i>	X	X	X					
<i>Liquidambar orientalis</i>	X	X	X			X		
- <i>styraciflua</i>	X	X	X		X	X		
<i>Liriodendron tulipifera</i>	X			X	X			
<i>Maclura pomifera</i>	X			X				
<i>Magnolia denudata</i>	X		X			X		
- <i>kobus</i>	X							
- <i>liliiflora</i>	X							
- <i>x soulangeana</i>	X							
- <i>stellata</i>	X							
<i>Malus floribunda</i>	X						X	
- <i>pumila</i>	X						X	
- <i>sargentii</i>	X						X	
<i>Morus alba</i>	X	X		X		X		X
- <i>glabra</i>							X	
- <i>minor</i>							X	
- <i>nigra</i>	X	X	X	X		X		X
- <i>rubra</i>	X		X	X			X	X
<i>Ostrya carpinifolia</i>	X		X	X	X	X	X	
<i>Paulownia tomentosa</i>	X	X				X		
<i>Platanus acerifolia</i>	X							
- <i>occidentalis</i>	X							
- <i>orientalis</i>	X	X	X	X	X	X	X	X
<i>Populus alba</i>	X		X		X		X	X
- <i>x canadensis</i>	X							
- <i>euphratica</i>	X							
- <i>euramericana</i>	X		X	X	X			
- <i>nigra</i>	X	X	X	X	X			X
- <i>simonni</i>	X							
- <i>tremula</i>	X	X	X	X	X		X	

	I	II	III	IV	V	VI	VII	VIII
- <i>usbekistanica</i>	X							
<i>Prunus avium</i>	X			X				
- <i>ceracifera</i>	X							
- <i>x domestica</i>	X							
- <i>persica</i>	X							
- <i>serrulata</i>	X							
- <i>spinosa</i>	X							
- <i>tomentosa</i>	X							
<i>Pterocaria fraxinifolia</i>	X		X		X	X		X
<i>Quercus brantii</i>	X						X	X
- <i>castaneaefolia</i>	X							
- <i>cerris</i>	X	X	X	X	X	X		X
- <i>frainetto</i>	X			X	X	X		
- <i>hartwissiana</i>	X				X	X		
- <i>infectoria</i>	X				X	X		
- <i>ithaburensis</i>	X			X				
- <i>libani</i>	X			X		X		X
- <i>palustris</i>	X				X	X		
- <i>petraea</i>	X		X	X	X	X	X	X
- <i>pubescens</i>	X	X		X	X	X		
- <i>robur</i>	X			X	X	X	X	
- <i>rubra</i>	X				X	X		
- <i>vulcanica</i>		X						
<i>Robinia pseudoacacia</i>	X			X			X	
<i>Salix alba</i>	X							
- <i>babylonica</i>	X	X	X			X	X	
- <i>caprea</i>	X							
- <i>fragilis</i>	X					X	X	
- <i>matsudana</i> 'Tortuosa'	X							
<i>Sophora japonica</i>	X	X	X					X
<i>Sorbus aucuparia</i>	X				X	X	X	
- <i>domestica</i>	X							
- <i>torminalis</i>	X	X	X	X	X	X		
<i>Tilia argentea</i>	X			X	X	X		
- <i>platyphyllos</i>	X		X			X		
- <i>rubra</i>	X					X		
<i>Ulmus glabra</i>	X	X	X	X	X	X		
- <i>leavis</i>	X							
- <i>minor</i>	X	X		X		X		X
- <i>parvifolia</i>	X					X		
<i>Zelkova carpinifolia</i>	X			X			X	X
<i>Zizyphus jujuba</i>	X	X	X		X			